

CLAIMS:

1. A semiconductor processing method comprising:
forming a metal silicide layer over a substrate;
depositing a layer comprising silicon, nitrogen and oxygen over the metal silicide layer; and
while the layer comprising silicon, nitrogen and oxygen is over the metal silicide layer, annealing the metal silicide layer.
2. The method of claim 1 wherein the layer comprising silicon, nitrogen and oxygen comprises $\text{Si}_x\text{N}_y\text{O}_z\text{H}$, wherein x is from 0.39 to 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33.
3. The method of claim 2 further comprising forming a layer of silicon nitride over the layer comprising silicon, nitrogen, oxygen and hydrogen.
4. The method of claim 2 further comprising forming a layer of silicon nitride over the layer comprising silicon, nitrogen, oxygen and hydrogen before the annealing.
5. The method of claim 1 wherein the depositing comprises chemical vapor deposition.

1 6. The method of claim 1 further comprising forming a layer
2 of silicon nitride over the layer comprising silicon, nitrogen and oxygen.

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4 7. The method of claim 1 further comprising forming a layer
5 of silicon nitride over the layer comprising silicon, nitrogen and oxygen
6 before the annealing.

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8 8. A semiconductor processing method comprising:
9 forming a metal silicide layer over a substrate;
10 depositing a layer comprising silicon, nitrogen and oxygen over the
11 metal silicide layer; and
12 forming a layer of silicon nitride over the layer of silicon,
13 nitrogen and oxygen.

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15 9. The method of claim 8 wherein the layer comprising silicon,
16 nitrogen and oxygen comprises $\text{Si}_x\text{N}_y\text{O}_z\text{H}$, wherein x is from 0.39 to
17 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33.

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19 10. The method of claim 8 wherein the depositing comprises
20 chemical vapor deposition.
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1 11. A semiconductor processing method comprising:
2 forming a metal silicide layer over a substrate;
3 chemical vapor depositing an antireflective material layer in
4 physical contact with the metal silicide;
5 forming a layer of photoresist over the antireflective material
6 layer; and
7 photolithographically patterning the layer of photoresist.

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9 12. The method of claim 11 wherein the deposited antireflective
10 material layer comprises silicon, nitrogen and oxygen.

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12 13. The method of claim 11 wherein the deposited antireflective
13 material layer comprises silicon, nitrogen, oxygen and hydrogen.

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15 14. The method of claim 11 further comprising forming a silicon
16 nitride layer over the deposited antireflective material layer, and wherein
17 the layer of photoresist is formed over the silicon nitride layer.
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1 15. A gate stack forming method, comprising:
2 forming a polysilicon layer over a substrate;
3 forming a metal silicide layer over the polysilicon layer;
4 depositing an antireflective material layer over the metal silicide
5 layer;
6 forming a silicon nitride layer over the antireflective material
7 layer;
8 forming a layer of photoresist over the silicon nitride layer;
9 photolithographically patterning the layer of photoresist to form
10 a patterned masking layer from the layer of photoresist; and
11 transferring a pattern from the patterned masking layer to the
12 silicon nitride layer, antireflective material layer, metal silicide layer and
13 polysilicon layer to pattern the silicon nitride layer, antireflective
14 material layer, metal silicide layer and polysilicon layer into a gate
15 stack.

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17 16. The method of claim 15 further comprising, while the
18 antireflective layer is over the metal silicide layer, annealing the metal
19 silicide layer

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21 17. The method of claim 15 wherein the depositing comprises
22 chemical vapor deposition.
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1 18. The method of claim 15 wherein the deposited antireflective
2 material layer comprises silicon, nitrogen, oxygen and hydrogen.

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4 19. The method of claim 15 wherein the deposited antireflective
5 material layer comprises silicon, nitrogen and oxygen.

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7 20. The method of claim 19 wherein the layer comprising
8 silicon, nitrogen and oxygen physically contacts the metal silicide layer.

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10 21. The method of claim 19 wherein the silicon nitride layer
11 physically contacts the layer comprising silicon, nitrogen and oxygen.

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13 22. The method of claim 19 wherein the silicon nitride layer
14 physically contacts the layer comprising silicon, nitrogen and oxygen, and
15 the layer comprising silicon, nitrogen and oxygen physically contacts the
16 metal silicide layer.

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18 23. Circuitry comprising:
19 a metal silicide layer over a semiconductive substrate; and
20 a substantially inorganic layer comprising silicon, nitrogen and
21 oxygen in physical contact with the metal silicide layer.
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24. The circuitry of claim 23 wherein the layer comprising silicon, nitrogen and oxygen is over the metal silicide layer, and further comprising a layer of silicon nitride over the layer comprising silicon, nitrogen and oxygen.

25. The circuitry of claim 23 wherein the layer comprising silicon, nitrogen and oxygen is over the metal silicide layer, and further comprising a layer of silicon nitride over and in physical contact with the layer comprising silicon, nitrogen and oxygen.

26. The circuitry of claim 23 wherein the layer comprising silicon, nitrogen and oxygen comprises $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$, wherein x is from 0.39 to 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33.

27. A gate stack, comprising:

- a polysilicon layer over a semiconductive substrate;
- a metal silicide layer over the polysilicon layer;
- a layer comprising silicon, oxygen and nitrogen over the metal silicide; and
- a silicon nitride layer over the layer comprising silicon, oxygen and nitrogen.

Sub
A2

1 28. The circuitry of claim 27 wherein the layer comprising
2 silicon, nitrogen and oxygen comprises $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$, wherein x is from 0.39
3 to 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33.
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5 29. The circuitry of claim 27 wherein the layer comprising
6 silicon, nitrogen and oxygen physically contacts the metal silicide layer.
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8 30. The circuitry of claim 27 wherein the silicon nitride layer
9 physically contacts the layer comprising silicon, nitrogen and oxygen.
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11 31. The circuitry of claim 27 wherein the silicon nitride layer
12 physically contacts the layer comprising silicon, nitrogen and oxygen, and
13 the layer comprising silicon, nitrogen and oxygen physically contacts the
14 metal silicide layer.
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17 Add
18 B3
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add
C3

add D2